Unit Description Form

Course Description Form

Faculty of Engineering / Department of

Unit Information		
Course Information		

		Unit delivery	
Unit Title	Histology		
Unit Type	Core	نظريه ☒	
Unit Code	BME-316	حاضر ☒	
ECTS Credits	8	المختبر ☒	
SWL (ساعة / SEM)	125	تعليمي ☐ عملي ☐ ☐ Seminar	

Unit level	3	**Delivery Semester**	1
Department of Administration	Biomedical Engineering	**College**	College of Engineering
Unit Commander	Kawthar Ali Hasan	**E-mail Address**	Kawthar.ali@uowa.edu.iq
Title of Unit Commander	Assist-Lecture	**Unit Commander Qualifications**	Doctor
Unit Teacher		**E-mail Address**	
Peer Reviewer Name	Name	**E-mail Address**	
Date of accreditation of the Scientific Committee	26/9/2024	**Version number**	1.0

Relationship with other units			
Relationship with other subjects			
Prerequisites Unit	No	**Semester**	
Common Requirements Unit	No	**Semester**	

	Unit objectives, learning outcomes and how-to contents Course objectives, learning outcomes and instructional contents	
Objectives of the Unit Course Objectives	The course aims to enable students to acquire the following skills: • Identify the different types of tissues in the body, such as epithelial, muscular, nervous, and connective tissues. • Enable students to gain general knowledge about tissues. • Understand the characteristics of tissues and the damage that may occur in them. • Learn about specialized types of tissues. • Recognize histological stains and their use in preparations and early detection of some diseases. • Understand the relationship between histology and physiology.	
Unit Learning Outcomes Learning outcomes of the course	1. Training the student on the purposeful engineering mindset 2. Make the student able to distinguish between engineering materials and their uses. 3. Applying theoretical concepts through conducting practical experiments on the properties of matter. 4. Recognize and understand how to choose the right material in the right place. The ability to analyze and discover the problem or error and the ability to find a solution to the error.	
Indicative Contents Indicative Contents	Introduction to Tissues: Defining the types of tissues and their basic functions. • Epithelial Tissues: Study of tissues that cover the internal and external surfaces of the body, such as the skin and intestines. • Muscle Tissues: Study of tissues responsible for movement, including skeletal, cardiac, and smooth muscles. • Nervous Tissues: Study of tissues that handle nerve signals, such as nerves and the brain. • Connective Tissues: Study of tissues that support and connect other tissues, such as tendons and cartilage. • Specialized Tissues: Such as blood, bone, and glandular tissues. • Pathological Changes in Tissues: Study of how tissues change due to diseases or injuries.	

	Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	1. Using the Smart Board and Illustrative Images Whenever Possible. 2. Using the Light Microscope at Different Magnifications with Objective and Eyepiece Lenses.	

Student Workload (SWL)
The student's academic load is calculated for 15 weeks

SWL منظم (h / sem) Regular academic load of the student during the semester	64	**SWL regulator(h/s)** Regular student load per week	4
SWL غير منظم (h / sem) Irregular academic load of the student during the semester	61	**Unregulated SWL (h/s)** Irregular student academic load per week	4
SWL إجمالى (h / sem) The student's total academic load during the semester			125

Unit Evaluation
Course Evaluation

	As	Time/Number	Weight (tags)	Week due	Related learning outcomes
Formative Assessment	**Contests**	2	10% (10)	5, 10	2&1
	Assignments	2	10% (10)	2, 12	2&1
	Projects /Laboratory.	1	10% (10)	continuous	2&1
	report	1	10% (10)	13	
Final Assessment	**Midterm Exam**	2 hr	10% (10)	7	2&1
	Final Exam	2 hours	50% (50)	16	every
	Overall Rating		100% (100 degree)		

Delivery Plan (Weekly Curriculum)
Theoretical Weekly Curriculum

week	Covered Material
Week 2+1	General Introduction: History of histology, review of cell components, and the concept of tissue.
Week 3	Epithelial Tissue: Characteristics of epithelial tissues, their functions, classification, and information about pseudostratified and transitional epithelium.
Week 4	Connective Tissue: Introduction to connective tissue, its functions, components, and ground substance
Week 5	Connective Tissue: Collagen fibers, elastic fibers, and reticular fibers.
Week 6	Bone Tissue: Components of bone, its functions, bone cells, types of bone tissue, and bone diseases
Week 7	Blood: Components and functions of blood, blood cells and plasma, and common blood disorders.
Week8	Cartilage: Histological structure of cartilage, cartilage cells, and functions of cartilage
Week 9	Types of Cartilage: Hyaline, elastic, and fibrocartilage.
Week 10	Nervous Tissue: Its types and characteristics, distribution in the body, and functions
Week 11	Muscle Tissue: Its types, characteristics, distribution in the body, and functions.
Week 12	Heart and Smooth Muscles

Week 13	Lymphatic System: Histological structure of some organs and its adaptation to function.
Week 14	Study of the Compound Light Microscope: Learning about the types of light microscopes and the cameras used for tissue imaging
Week 15	Exams

Learning and Teaching Resources Learning and Teaching Resources		
	text	**Available in the library?**
Required texts	Junqueiras- basic – histology and cell biology Text book of veterinary histology by samuelson 2010	Yes
Recommended texts	General Histology Books	Yes
Websites	http://www.iasj.net المجلات العلميه الاكاديميه	

Grading chart Grading chart				
group	**degree**	Appreciation	**Tags (%)**	**definition**
An-Najah Group (50 - 100)	**A - Excellent**	privilege	90 - 100	Outstanding Performance
	B - Very Good	Very good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Proper work with noticeable errors
	D - Satisfactory	medium	60 - 69	Fair but with significant shortcomings
	E - sufficient	Acceptable	50 - 59	The work meets the minimum standards
Group failure (0 – 49)	**FX - Failed**	Deposit (in (processing	(45-49)	More work required but credit granted
	F - Failed	Failure	(0-44)	Large amount of work required

Note: Signs that are more than 0.5 decimal places greater than or below the full mark will be rounded higher or lower (for example, a score of 54.5 will be rounded to 55, while a mark of 54.4 will be rounded to 54. The university has a policy of not tolerating "imminent traffic failure", so the only modification to the marks granted by the original mark(s) will be the automatic rounding described above.

MODULE DESCRIPTION FORM

Module Information			
Module Title	Engineering analysis	**Module Delivery**	
Module Type	Basic	☒ Theory ☒ Lecture Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	BME-315		
ECTS Credits	2		
SWL (hr/sem)	30		
Module Level		**Semester of Delivery**	1
Administering Department	BME	**College**	ENG
Module Leader	Ali mohammed abdulsadaa	**e-mail**	Ali.mohammed@uowa.edu.iq
Module Leader's Acad. Title	Assistant lecture	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	The topic of geometric analysis of frequency functions mathematically aims to clarify the practical and philosophical challenges of current geometric analyses that have stimulated this continuous development, as well as to provide the basic concepts of functions and their useful fields for further study of engineering sciences and applied analytical mathematics in the scientific and practical field. This is done starting from reviewing the basic principles, studying the meaning of the function and how to draw it on the attempt, analyzing the integrative in relation to time and frequency, finding the purpose for it, vectors, and finally the polar coordinates, in addition to introducing the principles of integration and calculus, their applications, and some functions in particular, in addition to increasing the opportunity for students to practice sound thinking methods, such as reflective, deductive, and inductive thinking, and increasing their skills in using the problem-solving method to understand what they are studying, and to reveal new relationships.
Module Learning Outcomes	1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply engineering design process to produce solutions that meet specified needs with consideration of public health, safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline. 3. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Indicative Contents	B. Skills objectives of the course
	  B1- Familiarity with the mathematical analytical relations that represent the types of algebraic functions and their drawing.
	  C2- Familiarity with the laws of finding the derivative using the definition and returning it to the basic function under the influence of the integration properties.
	  C3- Familiarity with finding the field and the corresponding field of a function with one variable and how to draw it in terms of Cartesian coordinates
	A4- Familiarity with concepts does not achieve the goal, solving immediate equations and performing algebraic operations on them.

Learning and Teaching Strategies
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	50		

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	3 hrs.	10% (10)	7	LO # 1-7
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Fourier series
Week 2	Complex Fourier series
Week 3	examples
Week 4	Fourier transform
Week 5	Application of fourier transform
Week 6	examples
Week 7	Midterm exam
Week 8	Laplace transform
Week 9	Invers laplace transform
Week 10	examples
Week 11	The sequence
Week 12	Z transform
Week 13	Application of Z transform
Week 14	examples
Week 15	examples
Week 16	Preparation week before the final exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Signals and systems , Sanjay sharma. 2011	Yes
Recommended Texts	Signals and systems , Sanjay sharma. 2011	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme			
Group	**Grade**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	(45-49)	More work required but credit awarded
	F – Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.			

MODULE DESCRIPTION FORM

Module Information			
Module Title	Mechanics of Material	**Module Delivery**	
Module Type	Basic	☒ Theory	
Module Code	WBM-31-02	☒ Lecture	
ECTS Credits	3	☒ Lab	
SWL (hr/sem)	150	☐ Tutorial ☐ Practical ☐ Seminar	

Module Level		**Semester of Delivery**		1
Administering Department	BME	**College**	ENG	
Module Leader	Natiq Aziz Omran	**e-mail**	Nataq.az@uowa.edu.iq	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

	Module Aims, Learning Outcomes and Indicative Contents
Module Aims	1. To develop problem solving skills and understanding of the behavior of engineering materials under different loading conditions. 2. To understand stress, strain, and deformation in structural members. 3. This course deals with the basic concepts of strength of materials. 4. This is a fundamental subject for mechanical and biomedical engineering applications. 5. To understand axial, torsional, and bending stress problems. 6. To perform stress and deformation analysis in beams, shafts, and structural elements. 7. To apply basic failure theories and material properties in engineering analysis.
Module Learning Outcomes	After successfully completing this module, students will be able to: 1. Explain the fundamental concepts of stress, strain, and deformation in engineering materials. 2. Identify and classify different types of loads and their effects on structural members. 3. Analyze axial stress and strain in bars subjected to tensile and compressive forces. 4. Evaluate torsional stresses and angles of twist in circular shafts. 5. Determine bending stresses and normal stresses in beams subjected to transverse loading. 6. Analyze shear stresses in beams and thin-walled members. 7. Apply the concepts of elastic behavior, Hooke's law, and material properties such as Young's modulus, shear modulus, and Poisson's ratio. 8. Calculate thermal stresses and strains resulting from temperature changes. 9. Assess combined stresses and determine principal stresses and maximum shear stresses. 10. Use appropriate failure theories to predict material behavior under different loading conditions. 11. Solve engineering problems related to strength and deformation of materials using analytical methods. 12. Demonstrate problem-solving skills relevant to mechanical and biomedical engineering applications.
Indicative Contents	Indicative content includes the following: Strength of Materials Theory Stress and strain concepts, types of stress and strain, mechanical properties of materials. Axial loading of members, elastic deformation and Hooke's law. Torsion of circular shafts, angle of twist and shear stress. Bending of beams, bending stress and flexural formula. Shear stress in beams. Combined stresses, principal stresses and failure theories. Thermal stresses and strains.

Learning and Teaching Strategies

Strategies	The main strategy adopted in delivering this module is to enhance students' understanding of the fundamental principles of strength of materials through lectures and problem-solving activities. Emphasis is placed on developing analytical skills by applying theoretical concepts to practical engineering problems. Lectures are used to explain key topics such as stress, strain, torsion, bending, and material behavior under different loading conditions. Problem-solving exercises are integrated into the teaching process to improve students' ability to analyze and solve numerical problems. Continuous assessment methods, including quizzes, assignments, and examinations, are used to evaluate students' progress and reinforce learning outcomes. This approach encourages active student participation and supports the development of critical thinking and independent learning skills.

Student Workload (SWL)

Structured SWL (h/sem)	123	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	27	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	150		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	11, 10	LO #1, 2,3 and 4
	Assignments	2	10% (10)	2, 12	LO # 5, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 7, 8 and 10
Summative assessment	**Midterm Exam**	3 hrs.	10% (10)	7	LO # 1-4
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Units and common principles and Analysis of Internal Forces and Stresses
Week 2	Normal stress and Shear stress and safety Factor
Week 3	Torsion of Circular Shaft and Torsion of non- circular section
Week 4	
Week 5	Current divider rule, open and short circuits.
Week 6	Series-Parallel Networks, series-parallel DC networks.
Week 7	Mid-term Exam
Week 8	Thin walled pressure vessels
Week 9	Simple Strain and Deformations of Axially Loaded Members
Week 10	Deformation of axially loaded members
Week 11	Displacement Diagram
Week 12	Statically indeterminate problems
Week 13	Thermal stresses and strains
Week 14	The Columns, Definition, The Critical load of column, Radius of Gyration.
Week 15	Combined Stresses, Combined axial and bending loading, Combined axial and torsional loading, Combined bending and torsional loading
Week 16	Preparatory week before the final Exam
Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: Introduction to mechanics of materials
Week 2	Lab 2: loading effects on material
Week 3	Lab 3: stress
Week 4	Lab 4: strain
Week 5	Lab 5: bending
Week 6	Lab 6: relation between stress and strain
Week 7	Lab 7: torsion

	Learning and Teaching Resources	
	Text	**Available in the Library?**
Required Texts	Strength of Materials, Third and Fourth Edition. Ferdinand and L.Singer Andrew Pytel	Yes
Recommended Texts	An Introduction to the Mechanics of Elastic and Plastic Deformation of Solids and Structural Materials THIRD EDITION E. J. HEARN Ph.D., B.Sc. (Eng.) Hons., C.Eng., F.I.Mech.E., F.I.Prod.E., F.1.Diag.E.	Yes
Websites	http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IITROORKEE	

Grading Scheme			
Group	**Grade**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	(45-49)	More work required but credit awarded
	F – Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

معلومات المادة الدراسية

Module Title	**Trunk Anatomy**	**Module Delivery**	
Module Type	Core	☒ Theory	
Module Code	BME-314	☒ Lecture	
ECTS Credits	5	☒ Lab	
		☐ Tutorial	
SWL (hr/sem)	125	☐ Practical	
		☐ Seminar	

Module Level	UGIII	**Semester of Delivery**	Five
Administering Department	BME.	**College**	ENG.
Module Leader	MSc. Ghufran Basim Medeb	**e-mail**	ghufran.basim95@gmail.com
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	MSc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	21/9/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To know the types of body tissues and distinguish their characteristics. 2. To understand nervous tissue histology 3. This course deals with the basic concept of Muscle tissue. 4. This is the basic subject for all body tissues. 5. To develop skills dealing with stain. 6. To Know the types of microscopes used in diagnosis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply engineering design process to produce solutions that meet specified needs with consideration of public health, safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline. 3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw a conclusion. Discuss the most important tissues that cover the skeletal system 4. An ability to communicate effectively with a range of audiences. 5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments which must consider the impact of engineering solutions in global, economic, environment, and social context. 6. An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge Discuss the most important dyes used in diagnosis 7. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Movements of shoulder joint Ventral and dorsal flexion , Movements of shoulder joint Abduction and adduction , Movements of shoulder joint External and internal rotation , Movements of elbow joint Flexion and extension, Movements of forearm Pronation and supination [12 hrs].

	Bones and joints of the vertebral column and Lower limb , Femur , Shaft of the femur , Patella , Tibia and fibula , Metatarsal bones [12 hrs]. Muscle tissue- structure, contraction and innervation of skletetal muscle, cardiac and smooth muscles, nervous tissue- histogenesis, cells, synapses, nerve fibers, nerves, ganglia, membranes and vessels of the CNS, blood-brain-barrier, cytoarchitecture of the spinal cord, cerebellum and cerebrum. The heart, the conducting system, its blood supply.[12hrs] Arteries and veins of the and abdominal pelvis and lower limb , femoral artery Branches, Profunda Femoris Artery, Arteriala nastomosis in the ll , Cannulation of femoral artery, Popliteal artery , Genicular anastomosis , Veins of the l.l , Superficial veins :great saphenous vein , Venae comitantes , Perforating veins , Varicose veins , Deep vein thrombosis (DVT. [20 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module encourage students' participation Dissection of rats and handling of dyes an laboratory slides,This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	1, 6, 7
	Assignment	2	10% (10)	2, 12	1, 6, 7
	Projects / Lab.	1	10% (10)	Continuous	1, 6, 7
	Report	1	10% (10)	13	1, 6, 7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	1, 6, 7
	Final Exam	2hr	50% (50)	16	1, 6, 7
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the anatomy of thorax,Thoracic cage organization, the sternum, the ribs and thoracic vertebrae,
Week 2	Irregular bones - general features e.g. vertebrae , Flat bones - general features e.g. scapula, sternum and ribs , Gross anatomy of bone , Clavicle , Scapula
Week 3	Bones and joints of the trunk , Skeleton , Function of bones , Identifying characteristics , Classification of bones
Week 4	Thoracohumeral muscles , Superficial (first) layer of back muscles , Shoulder girdle muscles , Rotator cuff , Incisura scapulae Suprascapular notch , Incisura spinoglenoidalis, Trigonum clavipectorale / deltopectorale
Week 5	the intercostals space and articulation of the thoracic cage, Functional anatomy of respiration and diaphragm
Week 6	pulmonary trunk, and major veins the mediastinum, autonomic nervous system in the thorax, pleura and lungs, lymph drainage
Week 7	Mid-term Exam
Week 8	the heart, pericardium and surfaces of the heart, the heart chambers, the coronary arteries, vein of the heart, the conductive system, aorta
Week 9	muscles of the antero-lateral abdominal wall, the inguinal region, Bones and joints of the vertebral column
Week 10	muscles and joints of the back, bony pelvis, ligaments and sex differences, muscles and fascia of pelvic walls and floor
Week 11	the liver and biliary passages, the pancreas and the spleen
Week 12	the kidney, suprarenal and ureter, posterior abdominal wall and diaphragm, vessels and nerves on the posterior abdominal wall, lymphatic of the abdomen

Week 13	the lumbar spine and anatomy of the intervertebral disc, muscles and joints of the back, bony pelvis, ligaments and sex differences
Week 14	duodenum, alimentary tract jejunum and ileum, the large intestine, arterial supply of the gut, venous drainage of the gut Arteries and veins of the abdominal pelvis , the peritoneum stomach, and
Week 15	muscles and fascia of pelvic walls and floor internal pelvic organs:rectum, anal canal and urinary bladder
Week 16	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Essentials of Anatomy, (7 th editions), by Valerie C. Scanlon, PhD, Tina Sanders	Yes
Recommended Texts	Snell's Clinical Anatomy by Regions, 10th Edition,by Lawrence E.Wineskl,PHD	Yes
Recommended Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A - Excellent**	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX – Fail**	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Ministry of Higher Education and Scientific Research - Iraq

University of Warith Al_Anbiyaa
Engineering College
Biomedical Engineering Department

MODULE DESCRIPTION FORM

Module Information				
Module Title	Laser and Fiber Optics		**Module Delivery**	
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	WBM-31-07			
ECTS Credits	4			
SWL (hr/sem)	150			
Module Level	3	**Semester of Delivery**	1	
Administering Department	BME	**College**	ENG	
Module Leader	Saad Mahmood Sarhan	**e-mail**	saad.mah@uowa.edu.iq	
Module Leader's Acad. Title	Assistant Doctor	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	Electromagnetic field	**Semester**	5

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	Building the student scientifically and qualifying him to understand: 1. Study the electromagnetic nature of light which includes the idealization of waves as light rays and the polarization of light 2. Study Fiber optics communication system, types of fiber also the medical applications with emphasis on those used in biomedical engineering. 3. OPTIWAVE Simulation System used in optical Lab
Module Learning Outcomes	A- Cognitive goals . 1. A1- The course provides the students the essential knowledge related to Study Fiber optics communication system 2. A2- The student learns types of fiber also the medical applications with emphasis on those used in biomedical engineering 3. A3- Study the electromagnetic nature of light which includes the idealization of waves as light rays and the polarization of light 4. A4- Performs laboratory experiments A5- Acquire skill in simulation and programming programs to illustrate different waveforms B. The skills goals special to the course. 5. B1 - Training the student to explore problems and find solutions 6. B2 - Training the student in scientific research in a specialized manner 7. B3 - Training the student on the practical application of the theoretical lecture and comparison between practical and theoretical results B 4- Training the student to form a scientific seminar and to participate in discussing and analyzing the results

Indicative Contents	Indicative content includes the following. **Part A : optical communication Systems** • Introduction: [4hrs] • Historical development; The general system; Advantages of optical fiber communication. [6hrs] • Optical Fiber Waveguides: [8 hrs] . • Fiber types; [8hrs] Ray theory transmission; Total internal reflection; Acceptance angle; Numerical aperture; Electromagnetic mode theory for optical propagation; Electromagnetic waves; Modes in a planer guide. [12 hrs] • Transmission Characteristics of Optical Fibers: [4 hrs] 3 • Attenuation; Material absorption losses; Intrinsic and extrinsic absorption; Linear scattering; Rayleigh and Mie scattering; • Nonlinear scattering losses; Stimulated Brillouin and Raman scattering; Fiber bend losses; Dispersion; Intra-modal dispersion; Inter-modal dispersion; modal noise. [4 hrs] **Part B: Medical application** • Endoscopes • Laser applications in dentistry • Optical fibers in Textiles • Laser Brain Surgery [12hrs] **Part C- Revision problem classes** [5 hrs]

Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	108	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	42	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	100		

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2
	Assignments	2	10% (10)	2, 12	LO #1, 2
	Projects / Lab.	1	10% (10)	Continuous	LO #1, 2
	Report	1	10% (10)	13	LO #1, 2
Summative assessment	Midterm Exam	3 hrs.	10% (10)	7	LO #1, 2
	Final Exam	3 hrs.	50% (50)	16	LO #1, 2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to optical communication system
Week 2	Benefits of Fiber Optics
Week 3	Nature of light
Week 4	Properties of light
Week 5	Fiber modes
Week 6	Types of optical fibers
Week 7	Light sources
Week 8	Light Emitting Diode
Week 9	Semiconductor laser.
Week 10	Transmission Characteristics of Optical Fibers
Week 11	Attenuation
Week 12	Dispersion
Week 13	MEDICAL APPLICATIONS OF OPTICAL FIBERS
Week 14	Endoscopes
Week 15	Laser applications in dentistry
Week 16	Preparatory week before the final Exam

	Learning and Teaching Resources	
	Text	**Available in the Library?**
Required Texts	GOVIND E P. AGRAWAL, "Fiber optics communication systems."	Yes
Recommended Texts	JOHN M. SENIOR, "Optical Fiber Communications	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/ optical Cmmunication	

Grading Scheme			
Group	**Grade**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	(45-49)	More work required but credit awarded
	F – Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information		
Module Title	**Digital Electronics**	**Module Delivery**
Module Type	Core	☒ Theory
Module Code	**BME-322**	☒ Lecture
ECTS Credits	**6**	☒ Lab
SWL (hr/sem)	**175**	☐ Tutorial ☐ Practical ☐ Seminar

Module Level	6	**Semester of Delivery**	6
Administering Department	BME	**College**	ENG
Module Leader	Asst. Lec. Ali Mohammed	**e-mail**	Ali.mohammed@uowa.edu.iq
Module Leader's Acad. Title	Asst.Lec	**Module Leader's Qualification**	Mse
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	09/02/2026	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	Electronics	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims أهداف المـادة الدراسية	1. Learn about the different digital systems, especially the digital system and the method of arithmetic operations. 2. Understand and understand how a computer performs arithmetic operations and how numbers and letters are represented in digital circuits. 3. Giving bases and concepts about encoding digital and text data inside the computer. 4. Develop the student's ability to design, analyze and implement the work of the synthetic digital circuit according to the equation or truth table. 5. Develop the student's ability to design, analyze and implement the synthetic digital circuit as required by the narrative. 6. Identify the work and analysis of some commonly used circuits in digital systems. 7. Teaching the student how the computer stores digital information and transmits it within the components of the computer. 8. Develop the student's ability to diagnose faults or errors in the work of synthetic digital circuits and repair them.
Module Learning Outcomes مخرجات التعلم للمـادة الدراسية	1. Training the student to enjoy the designer's mindset in different cases. 2. Making the student able to adapt to different circumstances and solve problems with the least available. 3. Converting the design from paper and pen to digital circuits that work either on the computer or on digital reality. 4. Recognize and understand all the principles of logical design 5. Recognize and understand how to understand and work with computer architecture and other digital systems. 6. The ability to analyze and discover the problem or error and the ability to find a solution to the error. 7. Develop the student's mentality to be able to make the theoretical requirement identical to the circuit he designs. 8. Develop students' skills in employing mathematical theories and equations to solve applied problems. 9. The ability to design and analyze multiple digital circuits using computer languages or virtually. 10. The ability of the student to build and form more complex digital circuits by connecting smaller digital circuits. 11. The ability to test all designed digital circuits and the ability to detect errors, if any.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Digital Fundamental and Combinational Logic Design Number Systems, Operations, and Codes, Logic Gates, Boolean Algebra and Logic Simplification, The Karnaugh Map, Combinational Logic Analysis, The Universal Property of NAND and NOR gates, Pulse Waveform Operation, Functions of Combinational Logic. [15 hrs] Revision problem classes [6 hrs] Part B – Sequential Circuits Latches, Flip-Flops, Timers, Flip-Flop Operating Characteristics, Flip-Flop Applications, One-Shots, The Astable Multivibrator, Shift Register Operations, Finite State Machines, Asynchronous and Synchronous counters, Cascaded Counters, and Logic Symbols with Dependency Notation.[15 hrs] Revision problem classes [6 hrs] Part C: Programmable Logic and Data Storage [15 hrs] Revision problem classes [6 hrs] Part D: Signal Conversion and Processing Revision problem classes [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Giving lectures and solving mathematical problems on the board. 2. Using modern technologies and electronic data show means to clarify the shapes, drawings, diagrams, and lecture vocabulary. 3. Focusing on students' participation in the lecture by asking questions, eliciting new ideas, and finding other ways to solve mathematical problems. 4. Adopting the homework method to solve the exercises by the students, while evaluating their solutions in the classroom.

Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	3 hrs.	10% (10)	7	LO # 1-7
	Final Lab Exam	2 hrs	10%(10)	16	All
	Final Exam	3 hrs.	40% (10)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Number Systems (Binary, HEX, BCD)
Week 2	Number System Arithmetic (Signed and Unsigned) and Digital Codes
Week 3	Logic Gates, Boolean Operations and Expression, Laws and Rules of Boolean, DeMorgan Theorm.
Week 4	Logic Simplification Using Boolean Algebra, SOP & POS, Boolean expression and Truth Tables
Week 5	The Karnaugh Map, (Karnaugh Map SOP Minimization, Karnaugh Map POS Minimization)
Week 6	Implementing of Combinational Logic Circuits (Adders, Parallel Adders, Comparators)

Week 7	Decoders, Encoders, Code C Code Converters, Multiplexers (Data Selectors), Demultiplexers, Parity Generators/Checkers
Week 8	Sequential Logics (Latches, Flip-Flops) and their applications
Week 9	One-Shot Monostable Circuit, Astable Multivibrator, 555 Oscillator
Week 10	Shift Register Operations, Types of Shift Register Data I/Os, Bidirectional Shift Registers Shift Register Applications
Week 11	Asynchronous Counters, Synchronous Counters, Up/Down Synchronous Counters
Week 12	Design of Synchronous Counters, Cascaded Counters
Week 13	Counter Decoding, Counter Applications
Week 14	Programmable Logic Devices (CPLDs, FPGAs)
Week 15	Signal Conversion and Processing (ADC and DAC)
Week 16	The preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Basic Logic Gates (AND – OR – NAND – NOR – XOR – XNOR)
Week 2	Lab 2: Combinational Logic Circuits 1- Full Adder , Parallel bit Adders, 4-bit binary Full Adder, cascaded Full Adder 2- Comparators, Multiplexers, De-Multiplexer, Parity Generators/Checkers
Week 3	Lab 3: Decoder, Encoders, Cascaded Decoder, Cascaded Encoder
Week 4	Lab 4: Latch circuits, S-R Flip Flop, D-Flip-Flop, J-K Flip Flop, T-Flip Flop
Week 5	Lab 5: One Shot circuits (Monostable, Astable)
Week 6	Lab 6: Counters, Cascaded Counters, Shifts Registers
Week 7	Lab 7: ADC and DAC circuits

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Digital Fundamental (Thomas Floyd)	Yes
Recommended Texts	1. Digital Circuits And Logic Design (Samuel C Lee) 2. Digital Logic & Computer Design (Mano) 3. Digital Design: With an Introduction to Verilog HDL	No
Websites	1. http://freecomputerbooks.com/	

2. https://www.tutorialspoint.com/computer_logical_organizatio n/index.htm
3. http://www.electronicsengineering.nbcafe.in/
4. https://www.geeksforgeeks.org/digital-electronics-logic-design -tutorials/

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	**امتياز**	90 - 100	Outstanding Performance
	B - Very Good	**جيد جدا**	80 - 89	Above average with some errors
	C - Good	**جيد**	70 - 79	Sound work with notable errors
	D - Satisfactory	**متوسط**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**مقبول**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**راسب (قيد المعالجة)**	(45-49)	More work required but credit awarded
	F – Fail	**راسب**	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Embedded System Programming**	**Module Delivery**
Module Type	Core	☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**BME-324**	
ECTS Credits	**3**	
SWL (hr/sem)	**75**	

Module Level	3	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Asst.Lec karrar aqeel	**e-mail**	karrar.aqeel@uowa.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Asst.Lec
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	11/08/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce students to the fundamentals of MATLAB programming and matrix-based computation. 2. To provide students with the knowledge and skills to perform mathematical operations, data analysis, and visualization using MATLAB. 3. To introduce the principles of Arduino hardware and programming for control and measurement applications. 4. To equip students with the ability to integrate MATLAB and Arduino for real-time data acquisition and system control.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Equip students with the foundational knowledge of MATLAB programming, variables, matrices, and basic operations for engineering applications. 2. Enable students to analyze and solve mathematical, algebraic, and differential equations using MATLAB functions and tools. 3. Develop students' ability to manage and manipulate data, including importing, processing, and visualizing results through MATLAB plots and graphs. 4. Build understanding of Arduino hardware components, architecture, and programming syntax for measurement and control systems. 5. Enable students to interface Arduino with sensors, actuators, and displays for real-time data acquisition and control. 6. Strengthen students' skills in implementing programming structures such as loops, conditionals, and functions in both MATLAB and Arduino environments. 7. Foster the ability to integrate MATLAB and Arduino for interactive projects involving data logging, motor control, and wireless communication. 8. Enhance students' competence in designing, testing, and troubleshooting MATLAB-Arduino systems for practical engineering applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. MATLAB: Introduction to MATLAB, variables and matrices, workspace management (save and load workspace data), basic arithmetic operations, equation writing, data types (single and integer), who function, dot product, cross product, sum function, solving linear equations, solving differential equations, solving algebraic equations, generating different types of matrices, matrix transpose, mean function, cumulative sum (cumsum) and cumulative product (cumprod), finding maximum and minimum values in large datasets, matrix multiplication and elementwise multiplication, extracting elements from matrices, extracting data from large Excel sheets, for loops, while loops, if-else conditional statements, plotting sine waves, plotting graphs, and plotting multiple graphs.

	Arduino: Arduino platform overview, hardware architecture, IDE and programming syntax, digital and analog I/O, PWM signal generation, sensors and actuator interfacing, serial communication with MATLAB, real-time data acquisition, motor control applications, LED and display interfacing, data logging, wireless modules, and integration of Arduino with MATLAB for measurement and control systems.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy for delivering this module is to actively engage students in practical exercises and hands-on activities, while fostering their problem-solving and analytical skills. This will be achieved through lectures, interactive programming tutorials, and laboratory sessions that combine MATLAB coding tasks with Arduino experiments. Students will work on small-scale projects and data acquisition activities that connect software analysis with hardware implementation, making the learning process both practical and engaging.

Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	112		

Module Evaluation				
تقييم المادة الدراسية				
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to MATLAB environment, variables, and matrices
Week 2	Workspace management (save and load data) and basic arithmetic operations, equation writing
Week 3	Data types (single and integer), who function, dot product, cross product, and sum function
Week 4	Solving linear equations, solving algebraic equations, generating different types of matrices
Week 5	Matrix transpose, mean function, cumsum and cumprod functions, finding maximum and minimum values in large datasets
Week 6	Matrix multiplication, elementwise multiplication, extracting elements from matrices and Excel sheets
Week 7	for loops, while loops, and if-else conditional statements
Week 8	Plotting sine waves, plotting single and multiple graphs
Week 9	Introduction to Arduino platform, hardware architecture, IDE, and programming syntax
Week 10	Digital and analog I/O, PWM signal generation, LED interfacing
Week 11	Sensor and actuator interfacing, real-time data acquisition
Week 12	Serial communication between Arduino and MATLAB, data logging
Week 13	Motor control applications, display interfacing (LCD, OLED)
Week 14	Wireless module integration (Bluetooth, Wi-Fi) and MATLAB-Arduino control systems
Week 15	Project development and integration of MATLAB with Arduino for measurement and control systems
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	**MATLAB Basics** • Exploring MATLAB interface and workspace. • Creating variables and performing basic arithmetic operations. • Saving and loading workspace data.
Week 2	**Matrices and Operations** • Creating and manipulating matrices. • Dot product, cross product, sum function. • Matrix transpose, mean, cumsum, and cumprod.

Week 3	**Equations in MATLAB** • Solving linear equations. • Solving algebraic equations. • Introduction to solving differential equations.
Week 4	**Data Handling in MATLAB** • Extracting elements from matrices. • Importing data from Excel sheets. • Finding max/min in large datasets.
Week 5	**Programming in MATLAB** • for loops, while loops. • if-else statements. • Writing basic MATLAB scripts.
Week 6	**Plotting in MATLAB** • Plotting sine waves and mathematical functions. • Creating multiple plots on the same graph. • Customizing plot appearance (titles, labels, legends).
Week 7	**Introduction to Arduino** • Overview of Arduino board and IDE. • Writing and uploading basic Arduino programs. • Digital I/O with LEDs and buttons.
Week 8	**Analog I/O and PWM** • Reading analog sensors (potentiometer, temperature sensor). • Generating PWM signals. • Controlling LED brightness.
Week 9	**Sensor Interfacing** • Interfacing Arduino with sensors (ultrasonic, LDR). • Reading and displaying sensor data in the Serial Monitor.
Week 10	**MATLAB–Arduino Communication** • Setting up serial communication. • Sending data from Arduino to MATLAB. • Real-time data plotting in MATLAB.
Week 11	**Actuator Control** • Controlling DC motors and servo motors. • Display interfacing (LCD or OLED). • Data logging from Arduino in MATLAB.
Week 12	**Integrated Project Lab** • Students design and implement a mini-project combining MATLAB and Arduino. • Examples: real-time temperature monitoring system, motor speed control with MATLAB GUI, wireless sensor data acquisition.

<table>
<tr><th colspan="3">Learning and Teaching Resources
مصادر التعلم والتدريس</th></tr>
<tr><td></td><td>Text</td><td>Available in the Library?</td></tr>
<tr><td>Required Texts</td><td>M. Rahmani-Andebili, MATLAB Lessons, Examples, and Exercises. Cham: Springer Nature Switzerland, 2024. doi: 10.1007/978-3-031-76177-5.</td><td>NO</td></tr>
<tr><td>Recommended Texts</td><td>M. Borgo, A. Soranzo, M. Grassi, and L. Battaglini, MATLAB for Psychologists. Cham: Springer Nature Switzerland, 2025. doi: 10.1007/978-3-031-82330-5.</td><td>NO</td></tr>
<tr><td>Websites</td><td colspan="2">https://www.mathworks.com</td></tr>
</table>

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Grading Scheme
مخطط الدرجات

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Ministry of Higher Education and
Scientific Research - Iraq

University of Warith Al_Anbiyaa
Engineering College
Biomedical Engineering Department

MODULE DESCRIPTION FORM

Module Information				
Module Title	Bone Injury and Fractures		**Module Delivery**	
Module Type	Core		☒ Theory	
Module Code	BME-322		☒ Lecture	
			☐ Lab	
ECTS Credits	4		☐ Tutorial	
			☐ Practical	
SWL (hr/sem)	100		☐ Seminar	
Module Level	3	**Semester of Delivery**		2
Administering Department	BME	**College**	ENG	
Module Leader	Aref samir	**e-mail**	aref.alsayad@uowa.edu.iq	
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	master	
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To know the Function of bones, Identifying characteristics. 2. To understand connective tissue histology 3. This course deals with the basic concept of Muscle tissue. 4. This is the basic subject for all body tissues. 5. To develop skills Upper limb, Clavicle. 6. To Know the types of microscopes used in diagnosis.
Module Learning Outcomes	1. Recognize all types of bone tissues. 2. Summarize Function of bones. 3. Learn about the function of cartilage in the body. 4. Discuss the most important tissues that cover the skeletal system 5. Discuss the characteristics of tissues in the reproductive system 6. Explain what lines the circulatory system of tissues 7. Describe the importance of the tissues of the bone system 8. Discuss the Bone injury and disease which used in diagnosis 9. Description of the immunohistochemistry technique 10. Electron microscopy and its importance in histological diagnosis
Indicative Contents	Nerves in leg, Lumbar plexus, Femoral nerve, Sciatic foramen: Greater Fibular (Peroneal) nerve, Tibial nerve, Fibular (Peroneal) nerve injury .

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' Skeleton , Function of bones, Identifying characteristics, Classification of bones and laboratory slides, This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	27	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	75		

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2
	Assignments	2	10% (10)	2, 12	LO #1, 2
	Projects / Lab.	1	10% (10)	Continuous	LO #1, 2
	Report	1	10% (10)	13	LO #1, 2
Summative assessment	Midterm Exam	3 hrs.	10% (10)	7	LO #1, 2
	Final Exam	3 hrs.	50% (50)	16	LO #1, 2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Bones of the upper limb , Skeleton , Function of bones, Identifying characteristics, Classification of bones , Long bones - general features e.g. humerus, femur
Week 2	Short bones - general features e.g. carpal and tarsal bones , Irregular bones - general features e.g. vertebrae , Flat bones - general features e.g. scapula, sternum and ribs , Gross anatomy of bone
Week 3	Upper limb, Clavicle , Scapula, Humerus , Ulna and Radius , Carpal bones
Week 4	Bones of the Lower limb , Femur , Shaft of the femur, Patella , Tibia and fibula , Metatarsal bones
Week 5	Tarsals, Tibia, Fibula , Position of femur, Shaft of the femur
Week 6	Bone of Shoulder girdle , Pneumatic bones - general features e.g. maxilla, frontal and , sphenoid bones , Sesamoid bones - general features e.g. patella (kneecap), Gross anatomy of bone , Shoulder

Week 7	Mid-term Exam
Week 8	spine , supraspinous fossa , infraspinous fossa, subscapular fossa , glenoid cavity , coracoid process , medial, lateral and superior borders , superior and inferior angles , supraglenoid and infraglen tubercles
Week 9	Joints Compulsory components, Optional components, Classification of joints - Uniaxial joints, Hinge, Pivot, Trochoginglimus, Classification of joints - Biaxial joints, Ellipsoid , Saddle
Week 10	Classification of joints - Multiaxial joints, Ball-and-socket, Special joint types, Restricted ball-and-socket, Amphiarthrosis, Sternoclavicular joint , Acromioclavicular joint , Shoulder joint
Week 11	Bone Cell and fibers , Osteocyte , Osteoblast , Osteoclast , Collagen fiber , Elastic fiber
Week 12	Reticular fiber , Fibroblast , Mesenchyme cell, Macrophage cell , Nerve cell
Week 13	Bone injury and disease , Tumor of bone , Necrosis of bone , Declassification
Week 14	Repair of bone , Growth of bone , Classification, Transition
Week 15	**Nerves of bone Median & Ulnar nerves , Median Nerve in Arm, Median Nerve in Hand , Median Nerve Lesion, Median Nerve Lesion at Wrist, Carpal Tunnel Syndrome, Lower-limb nerves**
Week 16	**Nerves in leg, Lumbar plexus, Femoral nerve, Sciatic foramen: Greater and Lesser, Fibular (Peroneal) nerve, Tibial nerve, Fibular (Peroneal) nerve injury .**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Clinical Anatomy of the Upper and Lower Limb, (10 th editions), by Kara Mudd, MSPAS, PA-C	Yes
Recommended Texts		No
Websites	https://ww.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme			
Group	Grade	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	(45-49)	More work required but credit awarded
	F – Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.			

Ministry of Higher Education and
Scientific Research - Iraq

University of Warith Al_Anbiyaa
Engineering College
Biomedical Engineering Department

MODULE DESCRIPTION FORM

Module Information			
Module Title	Engineering Analytics	**Module Delivery**	
Module Type	Basic	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	WBM-22-03		
ECTS Credits			
SWL (hr/sem)			
Module Level	1	**Semester of Delivery**	2
Administering Department	BME-111	**College**	ENG
Module Leader	Ahmed Merza	**e-mail**	ahmed.merza@uowa.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. The student will be able to use numerical methods to solve equations and apply them appropriately. 2. Acquire experience and knowledge in different types of differential equations and their numerical solution methods. 3. Acquire experience and knowledge in solving different types of integrals numerically. 4. Enable the student to demonstrate a solid understanding of mathematical concepts throughout the academic stages and apply them in the engineering field. 5. Develop an understanding of the fundamental ideas and concepts of numerical methods.
Module Learning Outcomes	1. How to write programs using **MATLAB** to solve mathematical problems and obtain numerical solutions. 2. Solving mathematical models that represent various physical and engineering systems numerically, and determining the best fit for experimental data. 3. Skills in computing different types of integrals using various numerical methods. 4. Skills in solving differential equations using a range of numerical methods. 5. 🎬 Skills in solving exercises from the prescribed textbook and supplementary references that have practical applications.
Indicative Contents	Indicative content includes the following. Solution of non-linear equations (8 hrs) Numerical Integration (8 hrs) Linear Interpolation (12 hrs) Finite differences (12 hrs) Numerical solution of ODE (12 hrs)

Learning and Teaching Strategies	
Strategies	The main strategy to be adopted in delivering this unit is to encourage students to prepare solutions, measure concentration, and practice laboratory techniques. This will be achieved through classroom sessions, interactive tutorials, and by considering simple experimental activities that include sampling tasks of interest to the students.

Student Workload (SWL)			
Structured SWL (h/sem)		Structured SWL (h/w)	
Unstructured SWL (h/sem)		Unstructured SWL (h/w)	
Total SWL (h/sem)			

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2
	Assignments	2	10% (10)	2, 12	LO #1, 2
	Projects / Lab.	1	10% (10)	Continuous	LO #1, 2
	Report	1	10% (10)	13	LO #1, 2
Summative assessment	Midterm Exam	3 hrs.	10% (10)	7	LO #1, 2
	Final Exam	3 hrs.	50% (50)	16	LO #1, 2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Linear Interpolation: Newton-Gregory
Week 2	Linear Interpolation: Lagrange interpolating polynomial
Week 3	Interpolation: General Equation
Week 4	Numerical integration: Equal segments Trapezoidal method
Week 5	Numerical integration: Unequal segments Trapezoidal method
Week 6	Numerical integration: Simpson's rules
Week 7	Numerical Integration: Gaussian Quadrature Method
Week 8	Solution of non-linear equations: Bisection method
Week 9	Solution of non-linear equations: Newton Raphson method
Week 10	Solution of non-linear equations: Secant method
Week 11	Numerical solution of ODE: Taylor series
Week 12	Euler method and modified Euler method
Week 13	Runge - Kutta method
Week 14	Finite differences method
Week 15	Matrix method
Week 16	**Final Exam Preparation Week**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**Numerical Methods of Engineers, Chapra &Canale, 6th Edition.**	Yes
Recommended Texts		No
Websites		

Grading Scheme			
Group	**Grade**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	(45-49)	More work required but credit awarded
	F – Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.			

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><td colspan="3" align="center">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td align="center"><b style="color:red">Neck and Nervous Anatomy</td><td>Module Delivery</td></tr>
<tr><td>Module Type</td><td align="center">Core</td><td rowspan="4">☒ Theory
☒ Lecture
☒ Lab
☐   Tutorial
☐   Practical
☐   Seminar</td></tr>
<tr><td>Module Code</td><td align="center"><b style="color:red">BME-323</td></tr>
<tr><td>ECTS Credits</td><td align="center">6</td></tr>
<tr><td>SWL (hr/sem)</td><td align="center"><b style="color:red">125</td></tr>
</table>

Module Level	UGIII	Semester of Delivery		Six
Administering Department	Type Dept. Code	**College**	Type College Code	
Module Leader	Natiq Aziz Omran	**e-mail**	Nataq.az@uowa.edu.iq	
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name	Name	**e-mail**	E-mail	
Scientific Committee Approval Date	16/2/2026	**Version Number**		1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To know the types of muscle tissues and distinguish their characteristics. 2. To understand nervous tissue histology 3. This course deals with the basic concept of nervous tissue. 4. This is the basic subject for all body tissues. 5. To develop skills dealing with stain. 6. To know the types of microscopes used in diagnosis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize all types of body tissues. 2. Summarize what is meant Muscles of Neck and Shoulder. 3. Learn about the function of cartilage in the body. 4. Discuss the most important tissues that cover the skeletal system 5. Discuss the characteristics Nerves of Neck and Shoulder Ulnar nerves 6. Explain what lines the circulatory system of tissues 7. Describe the importance of the tissues of the nervous system 8. Discuss the most important dyes used in diagnosis 9. Description of the immunohistochemistry technique 10. Electron microscopy and its importance in histological diagnosis were discussed

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Muscles of the Head and Face , Muscles of gluteal (SUPERFICIAL) region , Muscles of gluteal (DEEP) region , Muscles of thigh (HAMSTRING) region , Muscles of thigh (ANTERIOR) region , Muscles of thigh (ADDUCTOR) region [12 hrs] Genicular anastomosis , Veins of the l.l , Superficial veins :great saphenous vein , Venae comitantes , Perforating veins , Varicose veins , Deep vein thrombosis (DVT) [12 hrs] Muscle tissue- structure, contraction and innervation of skletetal muscle, cardiac and smooth muscles, nervous tissue- histogenesis, cells, synapses, nerve fibers, nerves, ganglia, membranes and vessels of the CNS, blood-brain-barrier, cytoarchitecture of the spinal cord, cerebellum and cerebrum. The heart, the conducting system, its blood supply. [12 hrs] Nerves of Neck and Shoulder Median & Ulnar nerves , Median Nerve in Arm , Median Nerve in Hand , Median Nerve Lesion . [20 hrs]

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' Muscles and nerve of Neck and Shoulder and laboratory slides, This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ٥١ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب اسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب اسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري
	Material Covered
Week 1	Nerve system, Nerve cells (neurons), Cell body, Dendrites, Axons.
Week 2	Glial cell (neuroglia), Astrocytes, Ependymal cell, Microglial cell, Oligodendrocytes, Schwann Cell, Satellite Cells.
Week 3	Nerve Impulses, Synaptic Communication, Common neurotransmitters and their actions, Myelination.
Week 4	Central Nervous System, Meninges, Dura Mater, Arachnoid, Pia Mater, Cerebral Lobes, Cerebrospinal Fluid, pituitary Glands.
Week 5	Muscles of Posterior Compartment of the leg (SUPERFICIAL) , Muscles of Posterior Compartment of the leg (DEEP) , Muscles of Anterior Compartment of the leg
Week 6	Muscles of Lateral Compartment of the leg , Muscles of Foot Posterior Compartment, Muscles of Foot Dorsal Aspect
Week 7	Mid-term Exam
Week 8	Vascular Anatomy Of The Neck and Shoulder , Arteries Of The Upper Limb , The Subclavian Artery, The Axillary Artery, Anastomosis, The Brachial Artery
Week 9	The Ulnar Artery, The Radial Artery, Anastomosis around Elbow Joint, Arteries of the palm
Week 01	Veins of the Upper Limb, Superficial Veins, Vein Catheterization , Median Cubital Vein
Week 11	Arteries and veins of the Neck and Shoulder , femoral artery , Branches, Profunda Femoris Artery, Arteriala nastomosis in the ll, Cannulation of femoral artery, Popliteal artery
Week 12	Genicular anastomosis , Veins of the l.l , Superficial veins :great saphenous vein , Venae comitantes , Perforating veins , Varicose veins , Deep vein thrombosis (DVT)
Week 13	Nerves of Neck and Shoulder Median & Ulnar nerves , Median Nerve in Arm , Median Nerve in Hand , Median Nerve Lesion
Week 14	Median Nerve Lesion at Wrist, Carpal Tunnel Syndrome , Lower-limb nerves , Nerves in leg , Lumbar plexus
Week 15	Femoral nerve , Sciatic foramen: Greater and Lesser , Fibular (Peroneal) nerve , Tibial nerve , Fibular (Peroneal) nerve injury
Week 16	**Preparatory week before the final Exam**

<table>
<tr><th colspan="3">Learning and Teaching Resources</th></tr>
<tr><th colspan="3">مصادر التعلم والتدريس</th></tr>
<tr><td></td><td>Text</td><td>Available in the Library?</td></tr>
<tr><td>Required Texts</td><td>Clinical Anatomy of the Neck and Nervous, (9 th editions), by David Kachlík</td><td>Yes</td></tr>
<tr><td>Recommended Texts</td><td>Snell Clinical Anatomy by Regions (9th Edition)</td><td>yes</td></tr>
<tr><td>Websites</td><td>1. https://www.kenhub.com
2. https://teachmeanatomy.info
3. https://www.getbodysmart.com
4. https://www.anatomyarcade.com
5. https://practiceanatomy.com</td><td></td></tr>
</table>

<table>
<tr><th colspan="5">Grading Scheme</th></tr>
<tr><th colspan="5">مخطط الدرجات</th></tr>
<tr><td>Group</td><td>Grade</td><td>التقدير</td><td>Marks (%)</td><td>Definition</td></tr>
<tr><td rowspan="5">Success Group (50 - 100)</td><td>A - Excellent</td><td>امتياز</td><td>90 - 100</td><td>Outstanding Performance</td></tr>
<tr><td>B - Very Good</td><td>جيد جدا</td><td>80 - 89</td><td>Above average with some errors</td></tr>
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<tr><td>D - Satisfactory</td><td>متوسط</td><td>60 - 69</td><td>Fair but with major shortcomings</td></tr>
<tr><td>E - Sufficient</td><td>مقبول</td><td>50 - 59</td><td>Work meets minimum criteria</td></tr>
<tr><td rowspan="2">Fail Group (0 – 49)</td><td>FX – Fail</td><td>راسب)قيد المعالجة(</td><td>(45-49)</td><td>More work required but credit awarded</td></tr>
<tr><td>F – Fail</td><td>راسب</td><td>(0-44)</td><td>Considerable amount of work required</td></tr>
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</table>

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information			
Module Title	Electrical Networks	**Module Delivery**	
Module Type	Basic	☒Theory ☒Lecture Lab ☐Tutorial ☐Practical ☐Seminar	
Module Code	BME-221		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level		**Semester of Delivery**	1
Administering Department	BME	**College**	ENG
Module Leader	Hussein Abdulkareem Saleh	**e-mail**	Hussein.abd@uowa.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

	Module Aims, Learning Outcomes and Indicative Contents
Module Aims	1. Teach the student the basics of networks engineering and its mathematics. 2. Enabling students to obtain knowledge and understanding in analyzing complex circuits and behavior operation amplifier. 3. The student's understanding of the behavior of signals in the frequency range, how to convert from time domain to frequency domain. 4. Enabling students to obtain knowledge and understanding of filters for different signals and frequency bands. 5. Enabling students to obtain knowledge and understanding of how embedding and how to analyze steady state and transient cases. 6. Enable students to obtain knowledge, understanding, analysis and syntax of various modulation types of RC and RL as well RCL. 7. Enable students to obtain knowledge, understanding, analysis and synthesis of the various modulation types of operation amplifier circuits like inverting and non-inverting and else circuits. 8. Enable the students to obtain knowledge, understanding, analysis and synthesis of methods for including mixing between series and shunt circuits. 9. Enable students to obtain knowledge, understanding and analysis of important electric circuits simple and complex. 10. Students' understanding of the causes of transient in networks and the method of mathematical analysis and methods of treatment.
Module Learning Outcomes	1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply engineering design process to produce solutions that meet specified needs with consideration of public health, safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
Indicative Contents	Indicative content includes the following. Operation amplifier, CMRR offset voltage, Frequency response, DC and AC transient, Analyze dependent and independent sources, First order circuits, Second order circuits, Laplace analysis for first order circuits and second order circuits.

	Learning and Teaching Strategies
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

Structured SWL (h/sem)	48	Structured SWL (h/w)	3
Unstructured SWL (h/sem)	27	Unstructured SWL (h/w)	1
Total SWL (h/sem)	75		

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2
	Assignments	2	10% (10)	2, 12	LO #1, 2
	Projects / Lab.	1	10% (10)	Continuous	LO #1, 2
	Report	1	10% (10)	13	LO #1, 2
Summative assessment	Midterm Exam	3 hrs.	10% (10)	7	LO #1, 2
	Final Exam	3 hrs.	50% (50)	16	LO #1, 2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction
Week 2	Operation amplifier
Week 3	CMRR offset voltage
Week 4	Frequency response
Week 5	Open loop and Close loop-Comparator – Integrator.
Week 6	DC and AC transient
Week 7	DC and AC transient- Pulse wave forms -RC response- Pulse definition- Duty cycle R-C response to the square wave input- Frequency domain analysis
Week 8	Explain many functions- Dependent active filter -Impulse function -Ramp function- Step function.

Week 9	Analyze dependent and independent sources
Week 10	Analyze dependent and independent sources
Week 11	Explain and analyze first and second order by using Laplace transform
Week 12	First order circuits
Week 13	Second order circuits
Week 14	Laplace analysis for first order circuits and second order circuits
Week 15	Two Port Networks, Admittance, Impedance, Hybrid, and Transmittance Parameters
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	George B. Thomas Jr., "CALCULUS", 14th Ed	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme			
Group	Grade	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
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Fail Group (0 – 49)	FX – Fail	(45-49)	More work required but credit awarded
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Unit Description Form

Course Description Form

Faculty of Engineering / Department of Biomedicine

Unit Information			
Course Information			
Unit Type	Electromagnetics		نظريه ☒
Unit Code	**BME-312**		حاضر ☒
ECTS Credits	**3**		المختبر ☒
SWL (ساعة / SEM)	**150**		تعليمي ☐
			عملي ☐
			☐ Seminar
Unit level	3	**Delivery Semester**	1
	Biomedical Engineering	**College**	College of Engineering
Unit Commander	Saad M. Sarhan	**E-mail Address**	saad.mah@uowa.edu.iq
Title of Unit Commander	Assistant Doctor	**Unit Commander Qualifications**	Doctor
Unit Teacher		**E-mail Address**	
Peer Reviewer Name		**E-mail Address**	
Date of accreditation of the Scientific Committee	26/9/2025	**Version number**	1.0

Unit objectives, learning outcomes and how-to contents
Course objectives, learning outcomes and instructional contents
Objectives of the Unit

Course Objectives	☐ Understand the fundamental concepts of scalars, vectors, vector algebra, and different coordinate systems. ☐ Apply Coulomb's Law and compute electric field intensity for different charge distributions (line, surface, and volume). ☐ Understand electric flux density, Gauss's Law, and the concept of divergence. ☐ Use the **Del operator** and apply the Divergence Theorem in field analysis. ☐ Analyze the relationship between electric potential and energy in electrostatic fields.
Unit Learning Outcomes Learning outcomes of the course	By the end of this unit, students will be able to: 1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply engineering design process to produce solutions that meet specified needs with consideration of public health, safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline. 3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw a conclusion. 4. An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge
Indicative Contents Indicative Contents	**1. Overview of Scalars, Vectors, Vector Algebra, and Coordinate Systems** - Definitions of scalar and vector quantities. - Vector operations: addition, subtraction, dot product, and cross product. - Coordinate systems: - Cartesian - Cylindrical - Spherical - Coordinate transformations. **2. Coulomb's Law and Electric Field Intensity + Charge Distributions** - Coulomb's Law for electric force. - Electric field intensity due to point charges. - Electric field for: - Line charge distributions - Surface charge distributions - Volume charge distributions

- Examples and tutorial problems.

3. Electric Flux Density, Gauss's Law, and Divergence
- Definition of electric flux density **D** and its relation to **E**.
- Gauss's Law and its mathematical forms.
- Applying Gauss's Law to symmetric field problems.
- Divergence and its physical interpretation in electrostatics.

4. Del Operator and Divergence Theorem
- Definition and components of the **Del (∇) operator**.
- The divergence operation ($\nabla\cdot\mathbf{A}$).
- Divergence Theorem and applications in field analysis.

5. Energy and Potential
- Electric potential and its relation to the electric field.
- Calculating potential for different charge distributions.
- Energy stored in the electric field.
- Relationship among work, potential, and electric field.

Learning and Teaching Strategies
Learning and Teaching Strategies

Strategies	☐ The instructor delivers detailed theoretical lectures. ☐ The instructor assigns periodic reports on the fundamental topics of the course. ☐ Continuous assessment: conducting short quizzes and regular exercises to monitor students' progress and identify areas that need reinforcement. ☐ Explanation and discussion: encouraging students to explain their solutions and reasoning to promote deep understanding and improve communication skills

Student Workload (SWL)			
The student's academic load is calculated for 15 weeks			
SWL منظم (h / sem) Regular academic load of the student during the semester	78	**SWL regulator(h/s)** Regular student load per week	4
SWL غير منظم (h / sem) Irregular academic load of the student during the semester	72	**Unregulated SWL (h/s)** Irregular student academic load per week	4

SWL (h / sem) إجمالي The student's total academic load during the semester					125

Unit Evaluation Course Evaluation					
	As	**Time/Number**	**Weight (tags)**	**Week due**	**Related learning outcomes**
Formative Assessment	**Contests**	2	10% (10)	5, 10	LO #1 , 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO #3 , 4, 6 and 7
	Projects /Laboratory.	1	10% (10)	continuous	every
	report	1	10% (10)	13	LO #5 , 8 and 10
Final Assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #1-7
	Final Exam	2 hours	50% (50)	16	every
	Overall Rating	100% (100 degree)			

Delivery Plan (Weekly Curriculum) Theoretical Weekly Curriculum	
week	**Covered Material**
Week 3+2+1	Overview about scaler, vector, vector algebra, and types of coordinate systems.
Week 4+5	Coulomb's Law and Electric Field Intensity, line charge, surface charge, and volume charge, Tutorial
Week 6+7+8+9	Electric Flux Density, Gauss's Law, and Divergence
Week 10+11+12	Del operator and Divergence Theorem
Week 13+14	Energy and Potential
Week 15	Maxwel Equatiions

Learning and Teaching Resources		
Learning and Teaching Resources		
	text	Available in the library?
Required texts	Electricity and Magnetism by Purcell	Yes
Recommended texts		Yes
Websites		

Grading chart				
Grading chart				
group	degree	Appreciation	Tags (%)	definition
An-Najah Group (50 - 100)	A - Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	Very good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Proper work with noticeable errors
	D - Satisfactory	medium	60 - 69	Fair but with significant shortcomings
	E - sufficient	Acceptable	50 - 59	The work meets the minimum standards
Group failure (0 – 49)	FX - Failed	Deposit (in processing)	(45-49)	More work required but credit granted
	F - Failed	Failure	(0-44)	Large amount of work required

Note: Signs that are more than 0.5 decimal places greater than or below the full mark will be rounded higher or lower (for example, a score of 54.5 will be rounded to 55, while a mark of 54.4 will be rounded to 54. The university has a policy of not tolerating "imminent traffic failure", so the only modification to the marks granted by the original mark(s) will be the automatic rounding described above.